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Establishing a cash flow from residential consumers to smart grid solution providers a Danish case study

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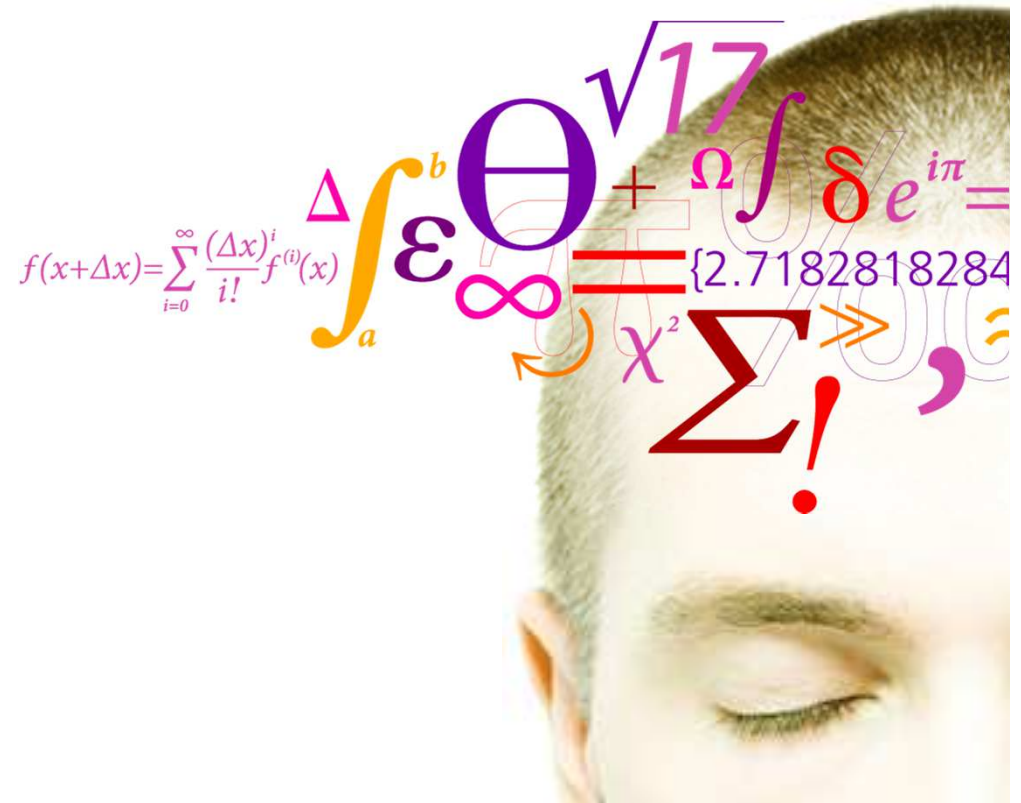
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Rasmus Villefrance

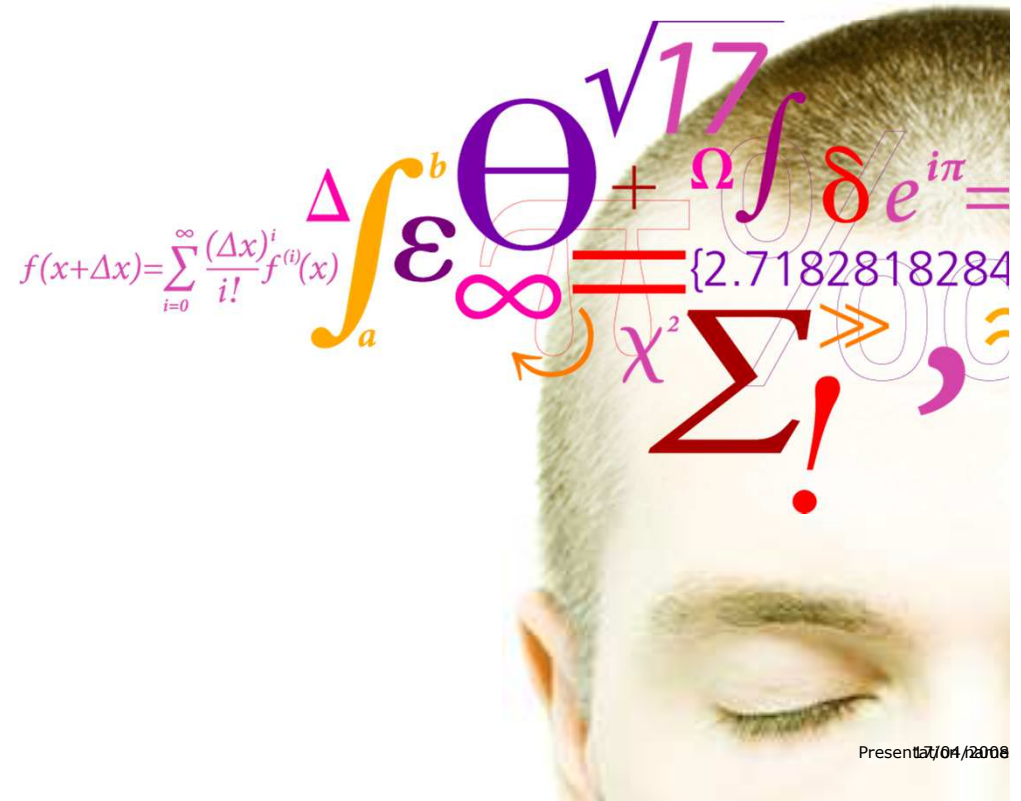
10-Sep-2013
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For DTU International Energy Conference



Establishing a cash flow from residential consumers to smart grid solution providers

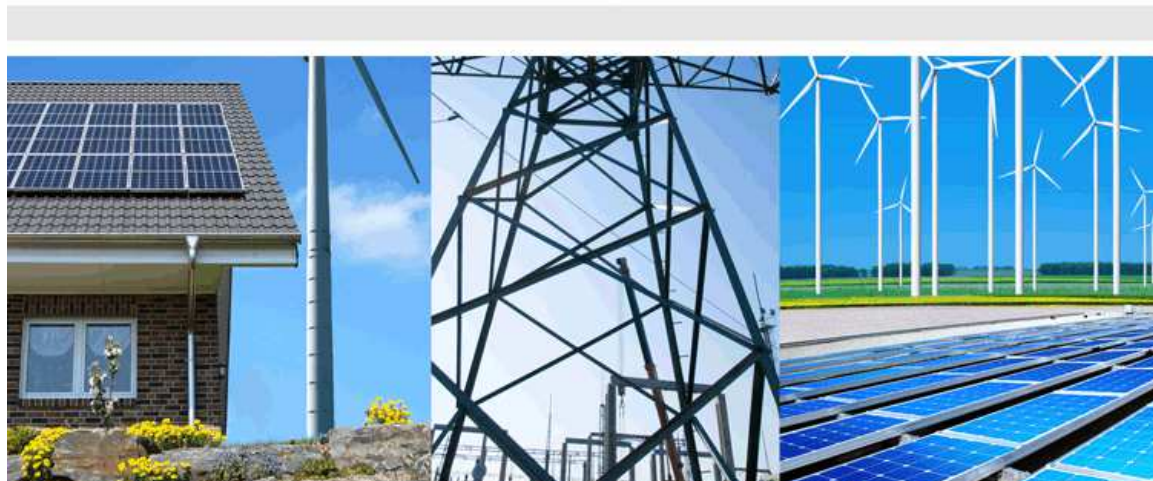
a Danish case study



Objective

The electrical grid must always be capable of absorbing electricity from fluctuating energy sources (wind, PV). Activation of flexible consumer demand is often cheaper than adding more distribution capacity (cables, transformers etc)

The iPower platform **links research and demonstration to actual product development** by specifying technologies, requirements and methods for smart grid products. It enables the industry partners to become first movers in a new and growing world market.





Partners

Cross disciplinary research and innovation platform:
26 partners, 2011–2016, 16 MEUR



Activities

1. Demonstration of residential Virtual Power Plant (VPP)
2. Demonstration of industrial VPP
3. Developing methods for cheap monitoring of distribution cables
4. Extending energy market places to deal with DSO level flexibility
5. Creating and evaluating business cases for society, utilities and the smart grid industry
6. Understanding consumer behavior towards energy flexibility cost

Activities

1. Demonstration of residential Virtual Power Plant (VPP)

- Heat pump control business case with current market mechanism
 - Consumer allows aggregator to control heat pump
 - Aggregator buys electricity on Nord Pool Spot when it is cheap
 - Aggregator activates heat pump when they have cheap energy
 - Potential: **EUR 1-5 per month per heat pump**
 - Our (unfinished) research indicates consumer wants ~EUR20/month to supply the flexibility, so something more than the money must drive

Why bother?

- A small but dynamic ecosystem within residential smart grid technology
- Primarily start-ups and small and medium sized enterprises (SME's)
 - Typically, the start-ups are involved in SW
 - SME's are developing and manufacturing energy components
- A significant part of the enterprises are involved in the iPower consortium.
 - A few companies have off-the-shelf smart grid products
 - Most are in the process of developing the products and services.

Start-up situation

- a significant proportion of the start-ups are experiencing slower than expected growth
 - One problem is that the domestic demand for smart grid technology is low
 - Some start-ups have found a way towards the export markets
- Not all start-ups are in a position to export from the beginning
 - Rely on the domestic market for the initial consolidation
 - Without a domestic market, the start-ups are in an unfavorable competitive situation compared with companies abroad.
- A domestic demand is a key enabler for growth.

Energy component industry

- Suppliers of energy components have not experienced a demand for products with embedded smart grid technology
- Companies have metering solutions for water, heat and electricity, but has not seen a demand from customers to use the technology for energy savings campaigns etc.
- Other companies have not finalized the development of smart grid enabled energy components (heat pumps, water heaters etc.)
 - This is due to the fact that no value proposition exists in Denmark (or elsewhere) for such products currently
 - Leading to a lack of demand for this type of products.
 - Only a few specialized positive business cases exist, such as remote control of air-to-air heat pumps in recreational houses.

Energy component industry

- Energy component industries risk to be bypassed by competitors abroad
 - develop smart grid enabled devices to meet demand on their home markets
- Thus, Denmark risk to lose industry jobs on the medium-long term if no domestic market exists for smart grid enabled products.

<i>Company</i>	<i>Employees</i>	<i>Type</i>	<i>Products</i>
Kamstrup	860	Industry	Smart metering systems for heating, power, cooling, water
Saseco	7	Start-up	Cloud solution for energy awareness
Develco	11-50	Development	Home Automation
Ista		Industry	Heat meters
Schneider Electric	~100	Industry	Home Automation
Danfoss	6300 (DK)	Industry	Heating solutions, district heating, PV inverters
Metro Therm	100	Industry	Water heaters
Nilan		Industry	Heat pumps
Vølund		Industry	Heat pumps
Lodam	50	Industry	Heat pump control
Neogrid	3	Start-up	Heat pump control
Insero Energy	6	Start-up	Business development
NorthQ		Start-up	Home Automation
GreenWave Reality	80	Development	Home Automation
Zense Technology	7	Start-up	Home Automation
Eurisco	2	Start-up	Heat pump control
Grundfos	4000 (DK)	Industry	Pumps

Proposal for generation of cash flow in 2014

- Consumers may optimize their electricity consumption due to acquisition of knowledge of their own consumption pattern.
 - Energy savings due to awareness and change of habits
 - Savings by means of automatic adaptation to the residents' needs
 - Energy consumption optimization executed by remote systems based on external criteria
- The savings potential is recorded in literature (sociological science)
 - In the range of 15%
 - Literature is currently being conducted

Energy savings mean business in Denmark

- The Danish Energy Agency legislative document “Aftale af 13. november 2012 om energiselskabernes energyspareindsats” provides a baseline:
 - The costs incurred due to the energy savings activities initiated by the distribution companies may be charged to the consumers (households, public sector and companies) as part of the energy cost
 - Savings potential is defined by means of a standard savings table for smaller, standardized activities. When assessing the savings potential, the standard savings value catalogue is to be used.

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STANDARDVÆRDIKATALOG FOR ENERGIBESPARELSER Webservice

Standardværdi-beregning Om standardværdikataloget Brugervejledning Nyheder Arkiv

Søg: Ref. ID eller fritekstsøgning Søg Vis mine besparelser

For at se standardværdikataloget i PDF format klik [her](#)

Version: 2.9 fra den 12.08.2013	Energibesparelse	Pr. faktor	Beregn
Belysning			
Cirkulationspumper			
EL-besparelser diverse			
Sluk alt knap/grønafbryder - central afbryder for reduktion af standby forbrug. Enfamilieboliger	327 kWh/år/	1,0	
Sluk alt knap/grønafbryder - central afbryder for reduktion af standby forbrug. Etageboliger/lejligheder	195 kWh/år/	1,0	
Fjernvarmeanlæg, afkølings- og energibesparelser			
Gaskedler			
Klimaskærm - isolering			
Klimaskærm - vinduer, ovenlys og døre			
Køl-frys			
Kontorudstyr			
Madlavning			
Oliekedler			
Solceller			

Conclusion

- The Danish energy Industry is facing a slower than expected growth due to lack of smart grid technology consumer pull
 - Business does not happen by itself!
- More aggressive exploitation of existing business cases is needed
 - Not necessarily a need for more technology
 - Cross-company collaboration may provide new opportunities to generate business

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